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DATA FROM CONTROLLED DRILLING PROGRAM IN DU PAGE COUNTY, ILLINOIS

JEAN I. LARSEN

CHARLES R. LUND

ILLINOIS STATE GEOLOGICAL SURVEY

JOHN C. FRYE, Chief • Urbana


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DATA FROM CONTROLLED DRILLING PROGRAM IN DU PAGE COUNTY, ILLINOIS

Jean I. Larsen and Charles R. Lund

Descriptions of character and sequence of materials and data on relative consistency, natural water content, and grain-size distribution are given for glacial deposits, tested and sampled as a part of a controlled drilling program, at nine sites in DuPage County, northeastern Illinois.

INTRODUCTION

Data gathered from field and laboratory analyses of samples collected from nine holes drilled in DuPage County (fig. 1) are presented here. These holes were drilled as part of a study of water resources management in the six-county metropolitan area of northeastern Illinois. A total of 52 holes was drilled in the area to obtain data and samples of the subsurface unconsolidated materials, which are mainly glacial drift deposits. Data from the borings in the other five counties will appear in future issues of this series. The program was coordinated by the Northeastern Illinois Metropolitan Area Planning Commission and financed by a planning grant provided by the Federal Home and Housing Finance Agency. The work was supervised by the Illinois State Geological Survey, and drilling was performed under contract by the Layne-Western Company of Aurora, Illinois.

The first number of this series (Environmental Geology Notes 1, April 1965) gave the specific objectives of the drilling and sampling program, a description of the drilling methods and equipment used to obtain the samples, and an explanation of the methods used to perform the various tests made on the samples by both the contractor and the Illinois Geological Survey.

IDENTIFICATION SYSTEM

The numbering system used to identify the borings is based on the location of the boring. The number of each hole consists of the county abbreviation, township, range, section, and coordinates within the section. Sections are divided into rows of one-eighth-mile squares. Each square contains 10 acres and corresponds to a quarter of a quarter section. A normal section of one square mile contains eight rows of eighth-mile squares; an

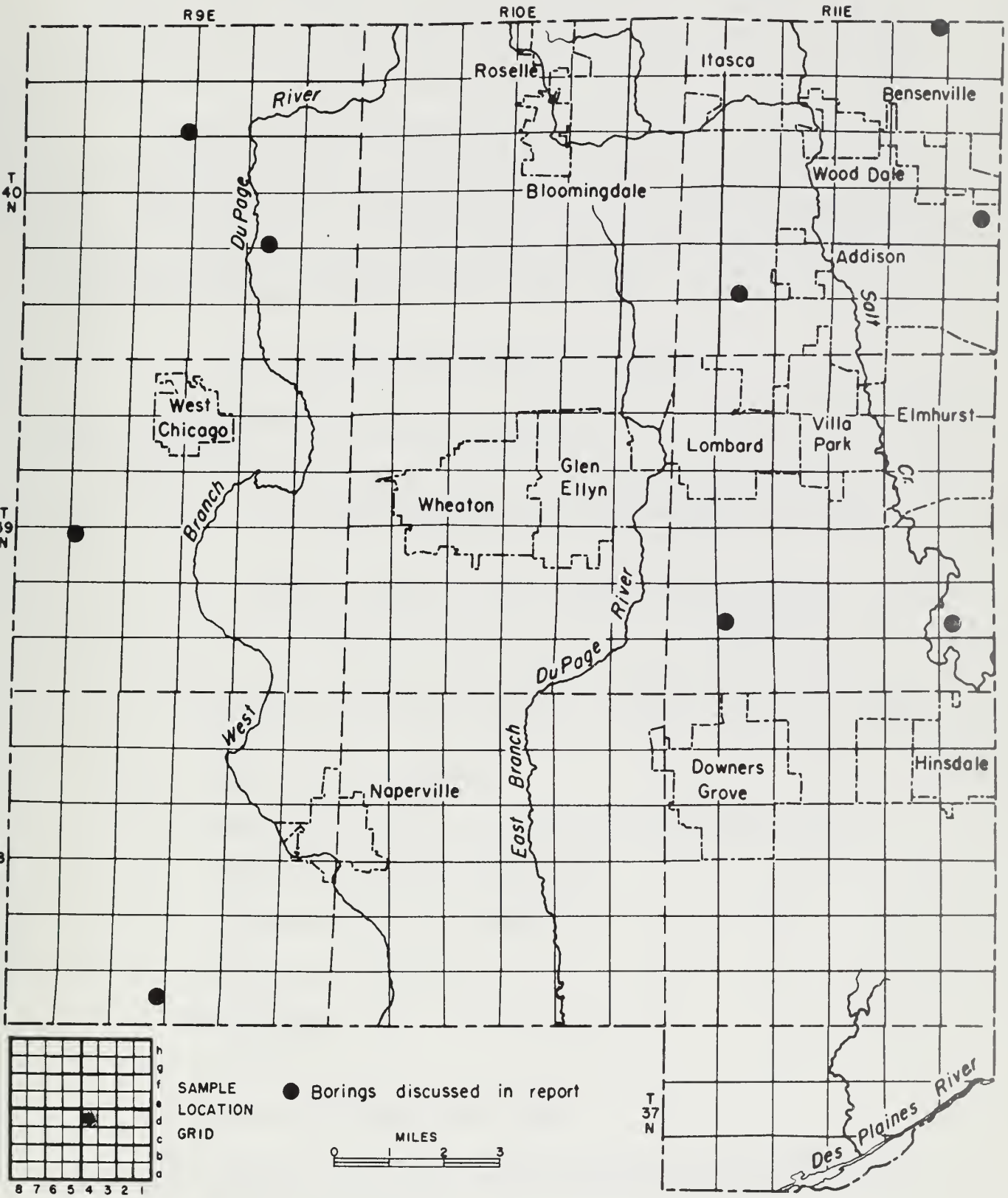


Fig. 1. - Location of borings in DuPage County.

odd-sized section contains more or fewer rows. Rows are numbered from east to west and lettered from south to north as shown in the grid on figure 1. For example, a well located in square 4d of section 30, township 39 north, range 9 east, would be numbered DUP 39N9E-30.4d. Where there is more than one boring in a 10-acre square they are identified by arabic numbers after the lower case letter in the boring number, for example, DUP 39N9E-30.4d2.

A location map is presented for each of the nine DuPage County borings, drawn on the scale of one inch equals 2000 feet, or 1:24,000, the scale of the United States Geological Survey 7½-minute quadrangle topographic maps. (These maps may be obtained from the Illinois State Geological Survey, Urbana, or from the U. S. Geological Survey, Washington, D.C.) The borings have been located within the 10-acre coordinate squares, with as much accuracy as this scale permits, according to detailed footage locations from easily recognizable landmarks supplied by the contractor.

EXPLANATION OF NOTES ON DRILLING RECORDS

The abbreviations and symbols used by the contractor on the drilling records included in this report are listed below.

Blows/ft - The number of blows of a 140-pound hammer falling 30 inches required to drive the split-barrel sampler for the last 12 inches of penetration.

81/2" - number of blows (81) required to drive a split-barrel sampler a certain number of inches (2").

Recovery (in.) - Length of the sample retained in the sampler.

Q_u - unconfined compressive strength expressed in tons per square foot (TSF).

MC - natural moisture content.

SS - split-barrel sampler 1 3/8 inches inside diameter (ID).

2S - split-barrel sampler 2 inches ID.

3S - split-barrel sampler 3 inches ID.

A - rectractable-type auger.

W - wash sample.

RC - rock core.

AX - 1 3/16-inch diameter rock core.

The relations between descriptive terms for relative density and relative consistency and the quantitative expressions for these aspects of the materials are shown on page 4.

Relative Density	
Description	Blows/ft
Very loose	0 - 5
Loose	5 - 10
Medium dense	10 - 30
Dense	30 - 50
Very dense	50+

Relative Consistency	
Description	Qu in TSF
Very soft	0.0 - 0.25
Soft	0.25 - 0.5
Medium	0.5 - 1.0
Stiff	1.0 - 2.0
Very stiff	2.0 - 4.0
Hard	4.0+

Descriptions of materials given in the drilling records were made in the field by the sampler and are not necessarily consistent with the laboratory data. Stratigraphic interpretation of the borings is under study and is beyond the scope of this report.

SIZE-DISTRIBUTION ANALYSIS

Analysis of the density and grain-size distribution of the cohesive and noncohesive materials was carried out in the laboratories of the Illinois State Geological Survey in Urbana, Illinois. The Tyler sieves and their U. S. Standard equivalents used in the grain-size analyses, the diameter of the mesh openings in inches and millimeters, and the Wentworth grain-size classification are shown in the following table.

Sieve number		Mesh diameter		Grain-size classification (Wentworth)
U.S. Standard	Tyler	(in.)	(mm)	
4	4	0.185	4.699	Granules and pebbles (gravel)
				----------2.0 mm----------
10	9	0.078	1.981	
18	16	0.0390	0.991	
25	24	0.0276	0.701	
35	32	0.0195	0.495	
45	42	0.0138	0.351	
60	60	0.0097	0.246	Sand
80	80	0.0069	0.175	
120	115	0.0049	0.124	
170	170	0.0035	0.088	
230	250	0.0024	0.061	----------0.0625 mm----------
				Silt
		Hydrometer separation		----------0.0039 mm----------
				Clay

The data presented in the size-distribution analysis for each boring is classified as follows:

gravel - >2.0 mm
sand - <2.0 mm and >0.062 mm
silt - <0.062 mm and >0.004 mm
clay - <0.004 mm

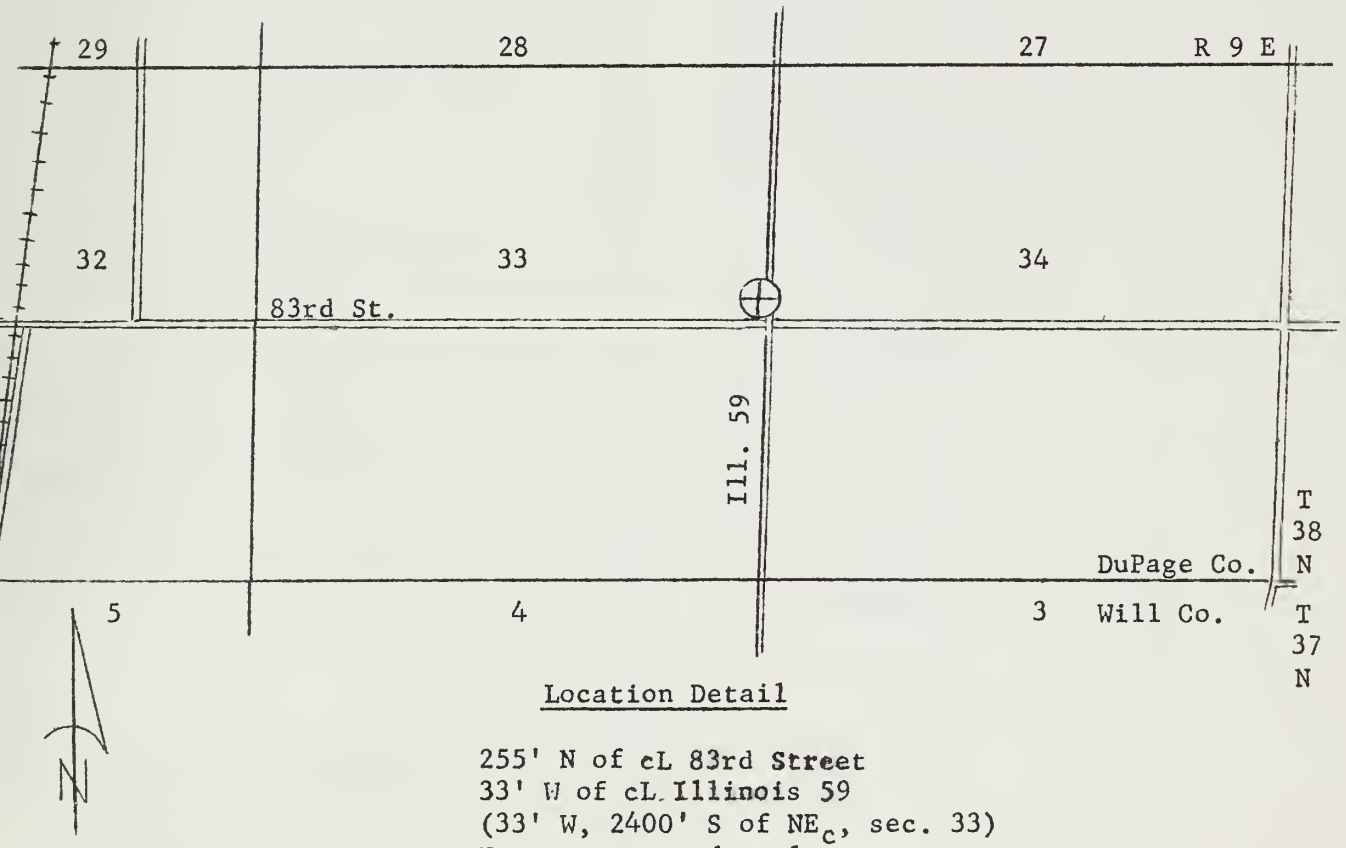
Some of the sample numbers in the tables giving grain-size data on the cohesive and noncohesive materials have letter symbols added that indicate the following:

A - Top bag of sample where two bags were used for a sampled interval

B - Bottom bag of sample where two bags were used for a sampled interval.

U - Upper portion of sample where one bag was used for a sampled interval.

Bo - Lower portion of sample where one bag was used for a sampled interval.



Location Detail

255' N of cL 83rd Street
33' W of cL Illinois 59
(33' W, 2400' S of NE_c, sec. 33)
Normantown Quadrangle

Fig. 2. - Location of boring DUP 38N9E-33.1e.

DRILLING RECORD FOR DUP 38N9E-33.1e

Surface elevation: 702.0 feet
Date started: 12-17-62
Date completed: 12-18-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
1.0	Topsoil, black							
5.0	Clay, silty, brown mottled with gray; local wash	1	2S	2.0— 3.5	14	17	7.8	25.0
		2	2S	4.5— 6.0	16	10	2.1	26.0
	Till — clay, silty, brown; trace sand and gravel	3	2S	7.0— 8.5	18	17	3.7	16.6
		4	2S	9.5—11.0	8	23	2.3	15.8
12.5		5	2S	12.0—13.5	18	41	8.2	17.8
15.0	Till — clay, silty, gray; occasional pebbles	6	2S	14.5—16.0	6	57		
17.0	Sand, fine to medium, dark gray	7	2S	17.0—18.5	0	27		
	Till — silt, sandy, brown-gray; some clay, cobbly & bouldery;	8	2S	19.5—21.0	6	23		
23.0	varies to sand, silty, gravelly	9	SS	22.0—23.5	10	25		20.1
	Till — clay, silty, gray; trace sand	10	SS	24.5—26.0	18	21	3.1	19.7
		11	SS	27.0—28.5	18	22	2.9	16.3
31.0		12	SS	29.5—31.0	12	53	1.4	18.2
33.3	Silt, gray; stratified sand partings	13	2S	32.0—33.5	12	37		
	Gravel, fine to coarse, sandy, gray; trace silt	14	SS	34.5—36.0	4	38		
37.5		15	SS	37.0—38.5	18	80		
40.8	Silt, gray; grades to fine sand at base of horizon	16	SS	39.5—41.0		45		
	Gravel, sandy, fine to coarse, gray; trace silt below 43.5'	17	SS	42.0—43.5	12	63		
		18	SS	44.5—46.0	18	83		
		19	SS	47.0—48.5	18	105		
50.5		21	W	47.0—52.0				
52.0	Broken rock (limestone)	20	SS	52.0	0	100/1"		
	Bottom of hole @ 52.0'							
	Hit water at 15'							

SIZE DISTRIBUTION DATA FOR DUP 38N9E-33.1e

Cohesive Materials

Sample	% >2.0 mm	% <2.0 mm	Size distribution of portion <2.0 mm		
			% >.062 mm	% >.004 mm	% ≤ .004 mm
3B	2.8	97.2	18	49	33
4	6.5	93.5	17	50	33
5B	1.8	98.2	6	50	44
6U	9.0	91.0	74	21	5
9B	2.0	98.0	8	37	55
10	7.0	93.0	11	33	56
11A	28.0	72.0	20	33	47
12	0.0	100.0	8	70	22
13T	1.2	98.8	16	52	32
16	0.0	100.0	39	59	2
17	43.0	57.0	72	26	2

Noncohesive Materials

Sample	Percentage retained on sieve										
	4	9	16	24	32	42	60	80	115	170	Pan
6Bo	4.0	5.3	13.9	4.9	6.6	7.8	10.2	7.1	6.9	5.8	27.5
18	27.8	15.8	15.0	6.2	7.4	5.6	4.2	2.6	2.3	1.9	11.2
19	23.9	9.6	9.5	2.8	3.1	5.6	16.2	11.9	5.9	3.0	9.3

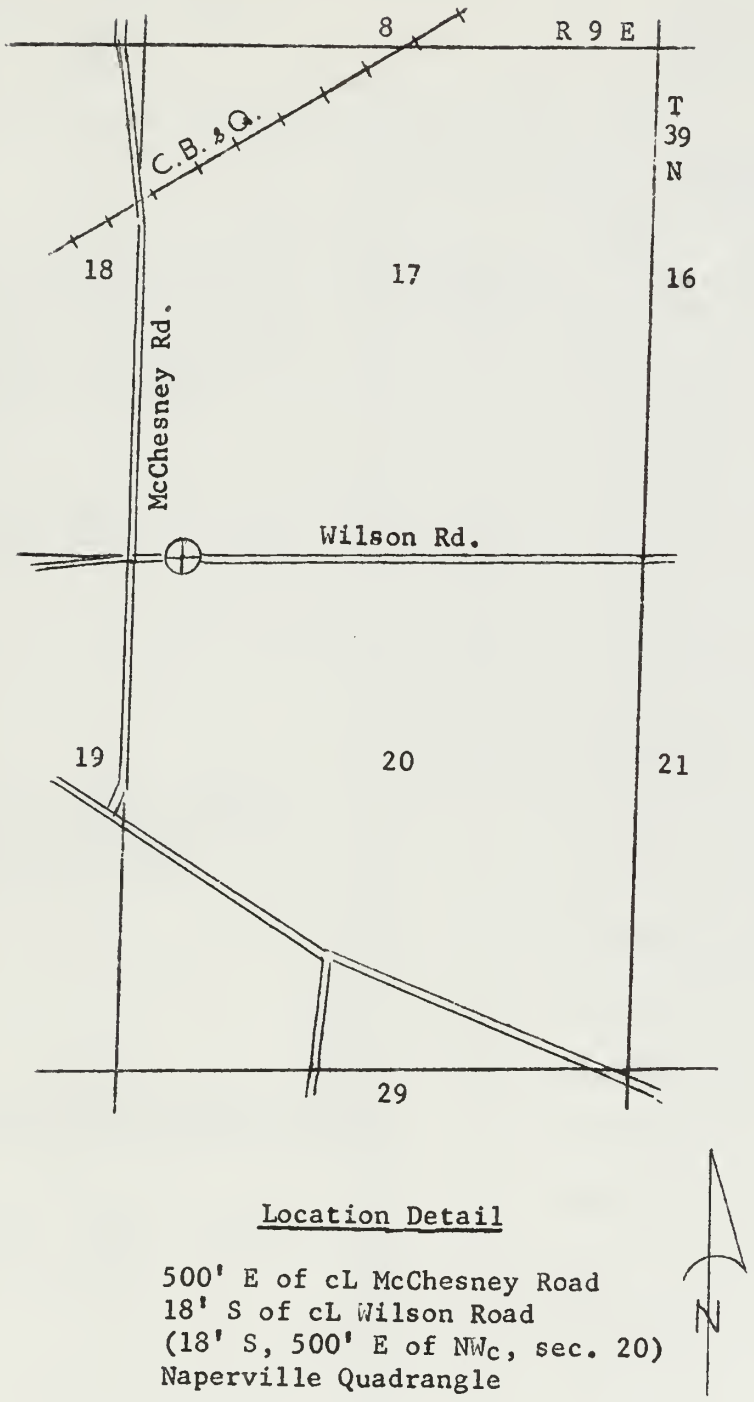


Fig. 3. - Location of boring DUP 39N9E-20.8h.

DRILLING RECORD FOR DUP 39N9E-20.8h

Surface elevation: 742.0 feet
Date started: 10-22-62
Date completed: 10-23-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
	Clay, silty, to silt, clayey, brown mottled with gray; local wash	1	2S	2.0— 3.5	15	11	1.6	28.2
		2	2S	4.5— 6.0	9	9		21.1
8.0		3	2S	7.0— 8.5	13	11		
	Silt, brown; grades to sandy silt	4	2S	9.5—11.0	12	12		
13.0		5	2S	12.0—13.5	8	17		
	Till — clay, silty, gray; trace sand and gravel; few cobbles; gravel seams	6	2S	14.5—16.0	13	17	2.8	14.9
		7	2S	17.0—18.5	15	43	1.4	14.5
		8	2S	19.5—21.0	18	20	3.8	14.3
		9	2S	22.0—23.5	18	28	4.4	15.4
		10	2S	24.5—26.0	18	21	3.1	16.6
		11	2S	27.0—28.5	18	21	3.0	18.4
32.5		12	2S	29.5—31.0	18	22	3.8	13.5
34.0	Till — silt, clayey, sandy, gray	13	2S	32.0—33.5	9	16		
	Till — clay, silty, sandy, gray; gravel seams	14	2S	34.5—36.0	18	20		
		15	2S	37.0—38.5	18	38	5.2	9.4
		16	2S	39.5—41.0	16	34	2.9	12.3
44.0		17	2S	42.0—43.5	2	38		
	Till — clay, silty, cobbly, gray	18	2S	44.5—46.0	18	25	3.3	12.3
		19	2S	47.0—48.5	18	33	2.7	11.1
		20	2S	49.5—51.0	18	37	3.3	12.3
54.0		21	2S	52.0—53.5	16	27	4.2	12.9
	Till — clay, gray, wet	22	2S	54.5—56.0	7	30	1.3	14.4
		23	2S	57.0—58.5	10	36	3.9	16.2

(Continued)

DRILLING RECORD FOR DUP 39N9E-20.8h - Continued

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
		24	2S	59.5—61.0	18	21	3.8	17.5
	Till -- clay, gray, wet	25	2S	62.0—63.5	18	48	1.6	18.2
68.5		26	2S	64.5—66.0	18	14	2.1	17.6
69.1	*	27	2S	67.0—68.5	12	47	0.8	19.4
	Bottom of hole @ 69.1'	28	2S	69.0—69.1	1	100/1"		

* Limestone fragments, tan; trace clay, silty, gray

SIZE DISTRIBUTION DATA FOR DUP 39N9E-20.8h

	Cohesive Materials				
			Size distribution of portion < 2.0 mm		
Sample	% >2.0 mm	% < 2.0 mm	% >.062 mm	% >.004 mm	% < .004 mm
1	0.0	100.0	5	60	35
2	0.0	100.0	6	72	22
3	0.2	99.8	25	64	11
4	0.0	100.0	10	82	8
5	0.2	99.8	11	79	10
6	1.3	98.7	10	53	37
7	1.0	99.0	13	57	30
8	2.0	98.0	10	58	32
9	1.0	99.0	4	55	41
10	2.0	98.0	12	58	30
11	1.0	99.0	7	65	28
12	13.0	87.0	5	58	37
13	15.0	85.0	36	49	15
14	16.0	84.0	34	50	16
15A	11.0	89.0	33	37	30
15B	16.0	84.0	37	48	15
16	8.0	92.0	27	58	15
18	11.0	89.0	26	47	27
19	7.0	93.0	27	45	28
20	4.0	96.0	23	47	30
21	6.0	94.0	23	44	33
22	9.0	91.0	21	46	33
23	4.0	96.0	17	41	42
24	4.0	96.0	17	43	40
25	6.0	94.0	16	40	44
26	8.0	92.0	15	44	41
27	3.0	97.0	15	42	43

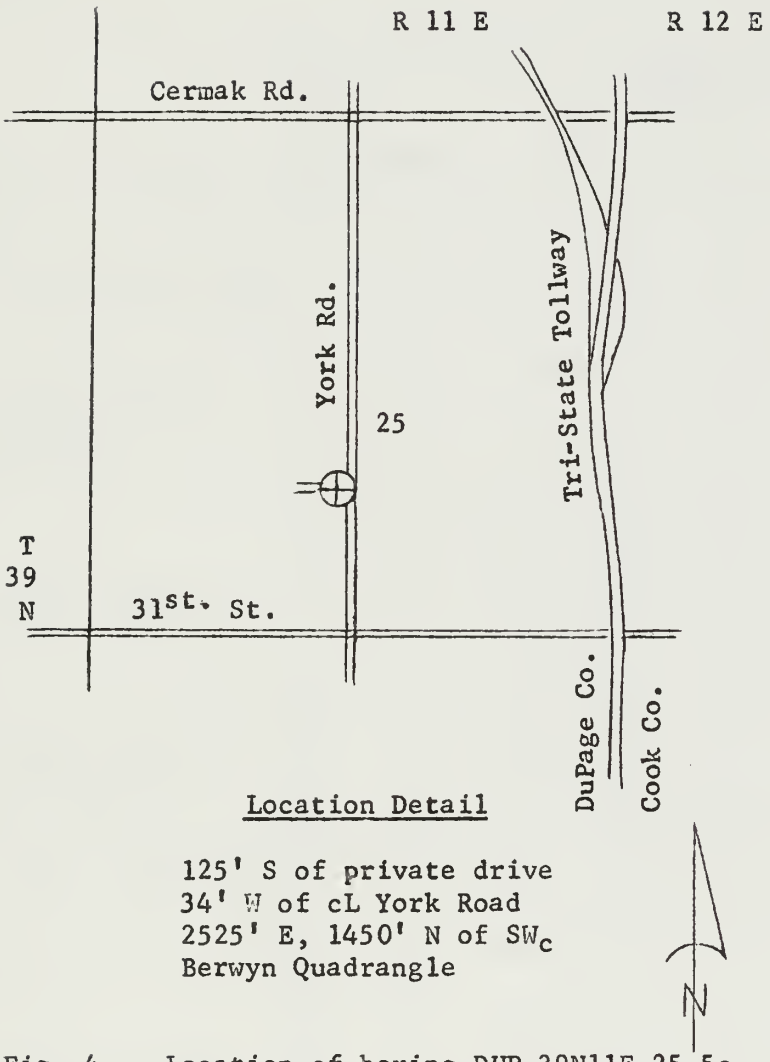


Fig. 4. - Location of boring DUP 39N11E-25.5c.

DRILLING RECORD FOR DUP 39N11E-25.5c

Surface elevation: 665.0 feet
Date started: 12-11-62
Date completed: 12-13-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
1.5	Topsoil, black	1	2S	2.0— 3.5	8	12	1.4	25.2
7.0	Clay, silty, brown mottled with gray	2	2S	4.5— 6.0	12	15	3.5	21.7
		3	2S	7.0— 8.5	1	16		
11.5	Till — clay, silty, brown; trace sand and gravel	4	2S	9.5—11.0	6	50		17.5
		5	2S	12.0—13.5	18	20	2.7	15.4
		6	2S	14.5—16.0	14	23		5.9
	Till — clay, silty, gray; occasional pebbles; almost free of sand	7	2S	17.0—18.5	14	15		18.6
21.5		8	2S	19.5—21.0	18	14		21.7
	Till — sand, clayey, gray; little silt-sand pockets	9	2S	22.0—23.5	12	14		12.6
25.0		10	2S	24.5—26.0	18	19		23.3
30.0	Till — clay, silty, gray; trace shale sand	11	2S	27.0—28.5	18	18		21.5
		12	2S	29.5—31.0	18	43		14.0
		13	2S	32.0—33.5	18	45		
	Sand, fine, gray; stratified with 6" till sheets at 30 to 33' and layers of coarse sand; coarse gravel at 37 to 43.5'	14	SS	34.5—36.0	18	100		
		15	SS	39.5—41.0	6	60		
		16	SS	44.5—46.0	8	31		18.4
43.5		17	SS	47.0—48.5	12	59		
	Clay, gray; some silt and silt partings	18	SS	49.5—50.0		Refusal		
47.5		19	AX	50.0—51.5				
50.0	Sand, fine, gray							
51.5	Limestone, gray							
	Bottom of hole @ 51.5'							

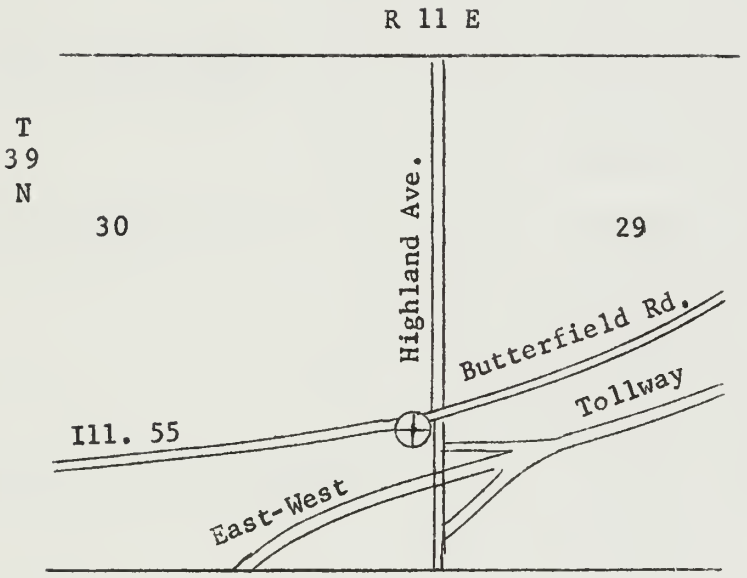
SIZE DISTRIBUTION DATA FOR DUP 39N11E-25.5c

Cohesive Materials

Sample	% > 2.0 mm	% < 2.0 mm	Size distribution of portion < 2.0 mm		
			% > .062 mm	% > .004 mm	% < .004 mm
1	4.0	96.0	17	38	45
3	3.0	97.0	19	43	38
5A	7.0	93.0	20	48	32
8B	2.0	98.0	9	42	49
9A	26.0	74.0	48	40	12
10B	1.0	99.0	7	40	53
12A	2.0	98.0	20	41	39
13	9.0	91.0	26	40	34

Noncohesive Materials

Sample	Percentage retained on sieve										
	4	9	16	24	32	42	60	80	115	170	Pan
14	0.0	0.3	1.7	4.2	18.7	28.4	24.2	9.3	5.1	2.2	5.9
15	93.9	4.4	1.0	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.1
19	0.0	0.3	0.6	3.9	14.8	16.9	19.9	13.2	14.6	7.1	8.7



Location Detail

6' S of Illinois 55 pavement
200' W of Highland Avenue pavement
1150' E, 1600' N of SW_c
Wheaton Quadrangle

Fig. 5. - Location of boring DUP 39N11E-29.7c.

DRILLING RECORD FOR DUP 39N11E-29.7c

Surface elevation: 767.0 feet
Date started: 11-29-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
1.5	Gravel fill	1	2S	2.0— 3.5	18	32	4.1	15.3
4.5	Till — clay, silty, brown; trace sand and fine gravel	2	2S	4.5— 6.0	18	22	4.0	13.2
		3	2S	7.0— 8.5	18	27	2.7	13.9
	Till — clay, silty, brown to gray; trace of gravel	4	2S	9.5—11.0	18	38	3.8	17.0
		5	2S	12.0—13.5	18	22	5.2	16.6
16.5		6	2S	14.5—16.0	18	27	5.2	16.7
		7	2S	17.0—18.5	18	14	2.2	9.9
	Till — clay, silty, gray; trace gravel; thin sand seam at 18'	8	2S	19.5—21.0	16	22	2.9	14.4
24.0		9	2S	22.0—23.5	0	20	4.4	15.1
		10	2S	24.5—26.0	14	28	5.2	13.3
	Till — clay, silty, gray, pebbly	11	2S	27.0—28.5	18	32	5.2	13.6
30.5		12	2S	29.5—31.0	17	29	4.3	11.6
	Till — clay, silty, gray-brown	13	2S	32.0—33.5	18	29	5.2	
34.0								
		14	2S	34.5—36.0	18	38	5.2	14.2
	Till — clay, silty, gray, pebbly	15	2S	37.0—38.5	18	27	5.6	11.4
41.5		16	2S	39.5—41.0	17	32	2.5	13.2
		17	2S	42.0—43.5	18	21		11.9
		18	2S	44.5—46.0	14	18	1.5	20.0
	Silt, clayey, brown to gray, with thin seams of sand and silt; a few pebbles	19	2S	47.0—48.5	17	27	2.5	21.9
		20	2S	49.5—51.0	18	23	1.5	17.5
		21	2S	52.0—53.5	18	23	2.5	19.0
56.5		22	2S	54.5—56.0	18	29	1.7	22.6
	(Sample described on next page)	23	2S	57.0—58.5	18	35	2.3	15.2

DRILLING RECORD FOR DUP 39N11E-29.7c - Continued

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
	Silt, gray; trace of fine sand at 62'	24	2S	59.5—61.0	18	30	3.5	21.8
		25	2S	62.0—63.5	18	26		22.4
		26	2S	64.5—66.0	18	52	4.5+	18.8
70.5		27	2S	67.0—68.5	16	81	4.5+	18.9
	Till — clay, silty, gray;	28	2S	69.5—71.0	12	94	4.5+	14.6
75.0	trace gravel	29	2S	72.0—73.5	15	69	4.9	12.7
	Till — silt, sandy, gray; grades to clayey silt, pebbly	30	2S	74.5—76.0	18	60	2.3	15.6
81.5		31	2S	77.0—78.5	16	91	3.3	8.9
	Till — clay, silty, sandy, gray; trace of gravel; seam of sandy silt at 85'-87.5'	32	2S	79.5—81.0	0	108		
		33	2S	82.0—83.5	18	58	4.6	13.0
		34	2S	84.5—86.0	14	101	5.2+	14.4
90.5		35	2S	87.0—88.5	15	103	3.0	15.5
94.0	Till — silt, clayey, gray, sandy, pebbly	36	2S	88.5—91.0	18	120		11.8
	Till — clay, silty, gray	37	2S	92.0—93.5	12	63	9.4	9.4
		38	SS	94.5—96.0	7	46	2.7	14.0
		39	SS	97.0—98.5	15	45	5.6	19.8
101.5		40	SS	99.5—101.0	9	71		12.0
	Sand, silty, very fine, gray; grades to sandy silt at 114'	41	SS	102.0—103.5	0	46		
		42	SS	104.5—106.0	12	108		
		43	SS	109.5—110.5	2	150		
114.0		44	SS	112.0—113.5	5	105		
	Silt, clayey, gray, with seams of clay; sand and silt, very pebbly	45	SS	114.5—116.0	10	97		12.1
		46	SS	117.0—118.5	10	230		11.8
		47	SS	119.5—121.0	7	157		17.2
		48	SS	122.0—123.0	12	50		18.1

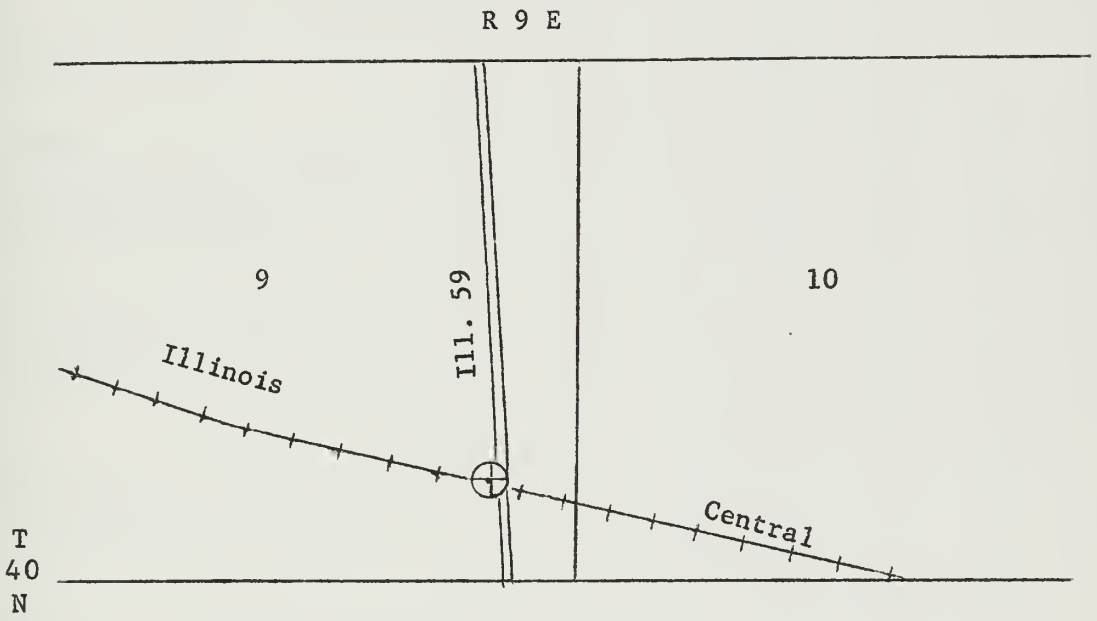
(Continued)

DRILLING RECORD FOR DUP 39N11E-29.7c - Continued

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
	(Description on preceding page.)	49	SS	124.5—126.0	12	122	1.8	19.6
129.0		50	SS	129.5—131.0	6	155		
	Sand, silty, medium to coarse, gray, cobbly	51	SS	134.5—135.0	4	88		
		52	SS	136.0—136.8	3	128/8"		
		53	W	136.8—140.0				
		54	W	140.0—145.0				
140.0		55	RC	145.0—150.0	7			14.4
	Sand, fine, brown							
145.0								
	Till — silt, clayey, gray, pebbly							
150.0								

SIZE DISTRIBUTION DATA FOR DUP 39N11E-29.7c

			Size distribution of portion <2.0 mm		
Sample	% >2.0 mm	% <2.0 mm	% >.062 mm	% >.004 mm	% <.004 mm
1A	9.0	91.0	21	48	31
2A	4.0	96.0	20	51	29
3A	6.0	94.0	26	48	26
4A	2.0	98.0	13	39	48
5A	5.0	95.0	15	46	39
6A	6.0	94.0	15	45	40
7A	18.0	82.0	16	47	37
10A	6.0	94.0	14	44	42
12A	5.0	95.0	21	45	34
13A	16.0	84.0	27	47	26
14A	6.0	94.0	16	42	42
17A	4.0	96.0	48	45	7
19A	0.0	100.0	6	70	24
22A	0.0	100.0	1	54	45
23A	0.0	100.0	16	74	10
25A	0.0	100.0	2	87	11
27B	4.0	96.0	15	69	16
28	23.0	77.0	7	75	18
29B	3.0	97.0	15	59	26
30B	5.0	95.0	15	58	27
33B	17.0	83.0	31	51	18
35B	13.0	87.0	20	54	26
37	7.0	93.0	32	53	15
38A	11.0	89.0	17	50	33
39B	1.0	99.0	1	52	47
40	7.0	93.0	20	50	30
42	0.0	100.0	52	35	13
44	3.0	97.0	11	74	15
47	0.0	100.0	9	66	25
49	0.0	100.0	2	59	39
50	58.0	42.0	52	43	5
55	20.0	80.0	29	43	28



Location Detail

50' N cL I.C.R.R.
40' E cL Illinois 59
600' W, 900' N of SE_c
Naperville Quadrangle

Fig. 6. - Location of boring DUP 40N9E-9.1b.

DRILLING RECORD FOR DUP 40N9E-9.1b

Surface elevation: 795.0 feet
Date started: 10-26-62
Date completed: 10-30-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
	Clay, silty, black mottled with tan; trace sand	1	2S	2.0— 3.5	8	14	4.5	21.4
		2	2S	4.5— 6.0	12	7	1.2	25.1
8.0	6" organic layer	3	2S	7.0— 8.5	18	17	4.5	8.1
10.0	Till — clay, silty, brown; trace sand and gravel	4	2S	9.5—11.0	18	18	3.2	15.7
	Till — clay, silty, gray; trace sand and gravel	5	2S	12.0—13.5	18	21	3.2	17.3
16.0		6	2S	14.5—16.0	18	12	3.2	
	Till — sand to clayey sand, gray; trace silt and gravel	7	2S	17.0—18.5	14	25		
		8	SS	19.5—21.0	2	50		
		9	2S	22.0—23.5	6	47		
26.5		10	2S	24.5—26.0	16	43		
28.0	Silt, gray; trace sand; few cobbles	11	2S	27.0—28.5	2	12		
	Gravel, sandy, gray; trace silt and clay	12	2S	29.5—31.0	8	37		
		13	SS	32.0—33.5	5	25		
		14	SS	34.0—35.5	4	19		
		15	SS	44.0—45.5	10	11		
		16	W	45.5—50.5				
		17	SS	54.0—55.5	18	19	2.7	16.3
		18	SS	56.5—58.0	6	16	2.5	18.5
		19	SS	59.0—60.5	7	12	2.3	17.4
53.0		20	2S	61.5—63.0	11	30	4.0	18.1
	Silt, clayey, grayish yellow-brown; trace pebbles	21	2S	64.0—65.5	18	25	2.1	22.4
		22	2S	66.5—68.0	18	33		12.2
58.0		23	2S	69.0—70.5	15	19		12.3
	(Lower part of sample 23 described on next page.)							

DRILLING RECORD FOR DUP 40N9E-9.1b - Continued

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
	Clay, silty, gray, with silt layers	24	2S	71.5—73.0	14	33		10.4
		25	2S	74.0—75.5	12	40		10.5
66.0		26	2S	76.5—78.0	18	31	2.0	11.5
	Till — silt, sandy, yellow, gray-brown; a little gravel; turns gray at 71', with a little clay	27	2S	79.0—80.5	4	150/4"		
		28	2S	81.5—83.0	18	40	3.2	11.5
		29	2S	84.0—85.5	18	45	4.5	11.2
		30	2S	86.5—88.0	18	26		
79.5		31	2S	89.0—90.5	10	110		
	Till — silt, clayey, gray, sandy; trace gravel							
88.5								
91.5	Gravel, sandy, coarse, gray, cobbly, angular							
	Bottom of hole @ 91.5'							

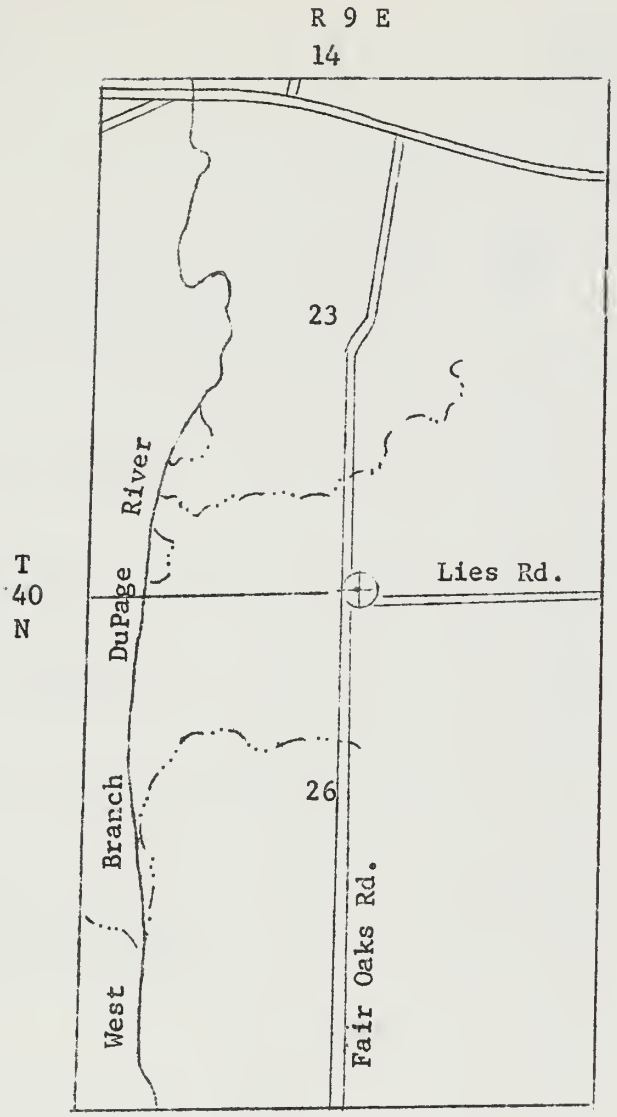
SIZE DISTRIBUTION DATA FOR DUP 40N9E-9.1b

Cohesive Materials

Sample	% >2.0 mm	% <2.0 mm	Size distribution of portion <2.0 mm		
			% >.062 mm	% >.004 mm	% <.004 mm
1	3.0	97.0	13	50	47
2	3.0	97.0	12	44	44
3A	8.0	92.0	14	42	44
3B	5.0	95.0	15	43	42
4A	4.0	96.0	16	40	44
5	4.0	96.0	16	43	41
6	4.0	96.0	19	43	38
7A	12.0	88.0	34	57	9
7B	0.2	99.8	9	85	6
10	5.0	95.0	14	80	6
15B	50.0	50.0	68	26	6
17	17.0	83.0	44	22	34
18	1.0	99.0	10	60	30
19	1.0	99.0	5	54	41
20	1.0	99.0	3	49	48
21	0.0	100.0	0	76	24
22	8.0	92.0	41	43	16
23	7.0	93.0	41	48	11
24	9.0	91.0	37	45	18
25	16.0	84.0	37	45	18
26	7.0	93.0	32	45	23
28	8.0	92.0	29	46	25
29	16.0	84.0	28	44	28

Noncohesive Materials

Sample	Percentage retained on sieve										
	4	9	16	24	32	42	60	80	115	170	Pan
12	37.1	13.8	16.5	4.6	5.4	4.3	4.9	3.2	2.5	1.5	6.2
15U	37.0	13.1	7.3	2.5	3.5	3.3	4.1	3.3	3.6	3.1	19.2



Location Detail

92' E cL Fair Oaks Road
22' N cL Lies Road
22' N, 2500' W of SE_c
West Chicago Quadrangle

Fig. 7. - Location of boring DUP 40N9E-23.4a.

DRILLING RECORD FOR DUP 40N9E-23.4a

Surface elevation: 762.0 feet
Date started: 10-23-62
Date completed: 10-25-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
4.0	Clay, brown and black mottled; possibly fill	1	2S	2.0— 3.5	16	19	1.7	24.1
	Clay, brown; a few pebbles	2	2S	4.5— 6.0	12	13	1.7	25.1
		3	2S	7.0— 8.5	18	16	3.3	23.1
11.5		4	2S	9.5—11.0	18	33	4.6	14.3
	Till — clay, silty, brown; a few pebbles and cobbles	5	2S	12.0—13.5	18	30	5.0	14.8
		6	2S	14.5—16.0	18	24	3.2	10.8
18.0		7	2S	17.0—18.5	18	22	3.6	15.4
	Till — clay, gray; trace of yellow mottling; sand, gravel and cobbles	8	2S	19.5—21.0	17	19	2.9	16.2
		9	2S	22.0—23.5	18	21		17.6
		10	2S	24.5—26.0	16	28	3.6	18.2
		11	2S	27.0—28.5	12	25	3.7	19.1
32.0		12	2S	29.5—31.0	18	22	2.5	12.6
	Till — silt, clayey, gray-brown; trace sand and gravel	13	2S	32.0—33.5	18	27	2.1	16.0
		14	2S	34.5—36.0	18	34	4.0	13.5
		15	2S	37.0—38.5	18	20	2.7	13.7
41.5		16	2S	39.5—41.0	18	36	4.3	15.7
	Till — clay, silty, gray; some cobbles; some brown sand seams	17	2S	42.0—43.5	18	65		
46.0		18	2S	44.5—46.0	18	26		
	Till — clay, gray; a few pebbles	19	2S	47.0—48.5	15	26	4.6	12.8
49.5		20	2S	49.5—51.0	12	29		
	Till — silt, sandy, gray; some coarse sand and gravel	21	2S	52.0—53.5	7	34		
		22	2S	54.5—56.0	4	50		
		23	2S	57.0—58.5	5	118		

(Continued)

DRILLING RECORD FOR DUP 40N9E-23.4a - Continued

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
	Till — silt, sandy, gray; some coarse sand and gravel	24	2S	59.5—61.0	3	150		
		25	2S	62.0—63.5	0	169		
68.0		26	2S	64.5—66.0	4	34		
	Clay, gray; trace silt, sand and gravel; sand pockets	27	2S	67.0—68.5	4	30		
		28	2S	69.5—71.0	5	42		
		29	2S	74.5—76.0	18	43		
		30	2S	77.5—81.0	18	38		
		31	2S	84.5—86.0	14	132		
83.0		32	2S	89.5—91.0	10	150		
	Sand, fine, gray to brown, sorted	33	2S	94.5—96.0	2	38		
		34	2S	97.0	0	152		
97.0								
	Bottom of hole @ 97' Hit water @ 42' Sand pockets heaved up into auger 9' from 67' to 97'. Bedrock appeared to be dolomite.							

SIZE DISTRIBUTION DATA FOR DUP 40N9E-23.4a

Cohesive Materials

Sample	% >2.0 mm	% <2.0 mm	Size distribution of portion <2.0 mm		
			% >.062 mm	% >.004 mm	% <.004 mm
2	2.0	98.0	11	38	51
3	1.0	99.0	12	37	51
4	3.0	97.0	14	39	47
5	3.0	97.0	13	43	44
6	2.0	98.0	13	41	46
7	2.0	98.0	13	43	44
8	1.0	99.0	14	41	45
9	3.0	97.0	14	44	42
10	1.0	99.0	6	41	53
11	1.0	99.0	5	38	57
12	5.0	95.0	16	52	32
13	4.0	96.0	18	47	35
14	2.0	98.0	10	49	41
15	3.0	97.0	11	45	44
16	1.0	99.0	6	52	42
17	4.0	96.0	13	46	41
18	8.0	92.0	18	51	31
19	10.0	90.0	25	45	30
20	1.0	99.0	5	90	5
29	7.0	93.0	29	44	27

Noncohesive Materials

Sample	Percentage retained on sieve										
	4	9	16	24	32	42	60	80	115	170	Pan
31	1.6	5.1	14.7	7.1	8.1	7.3	8.5	7.5	10.9	10.1	19.1
32	8.4	21.5	44.4	13.4	6.9	2.2	1.3	0.5	0.3	0.1	1.0

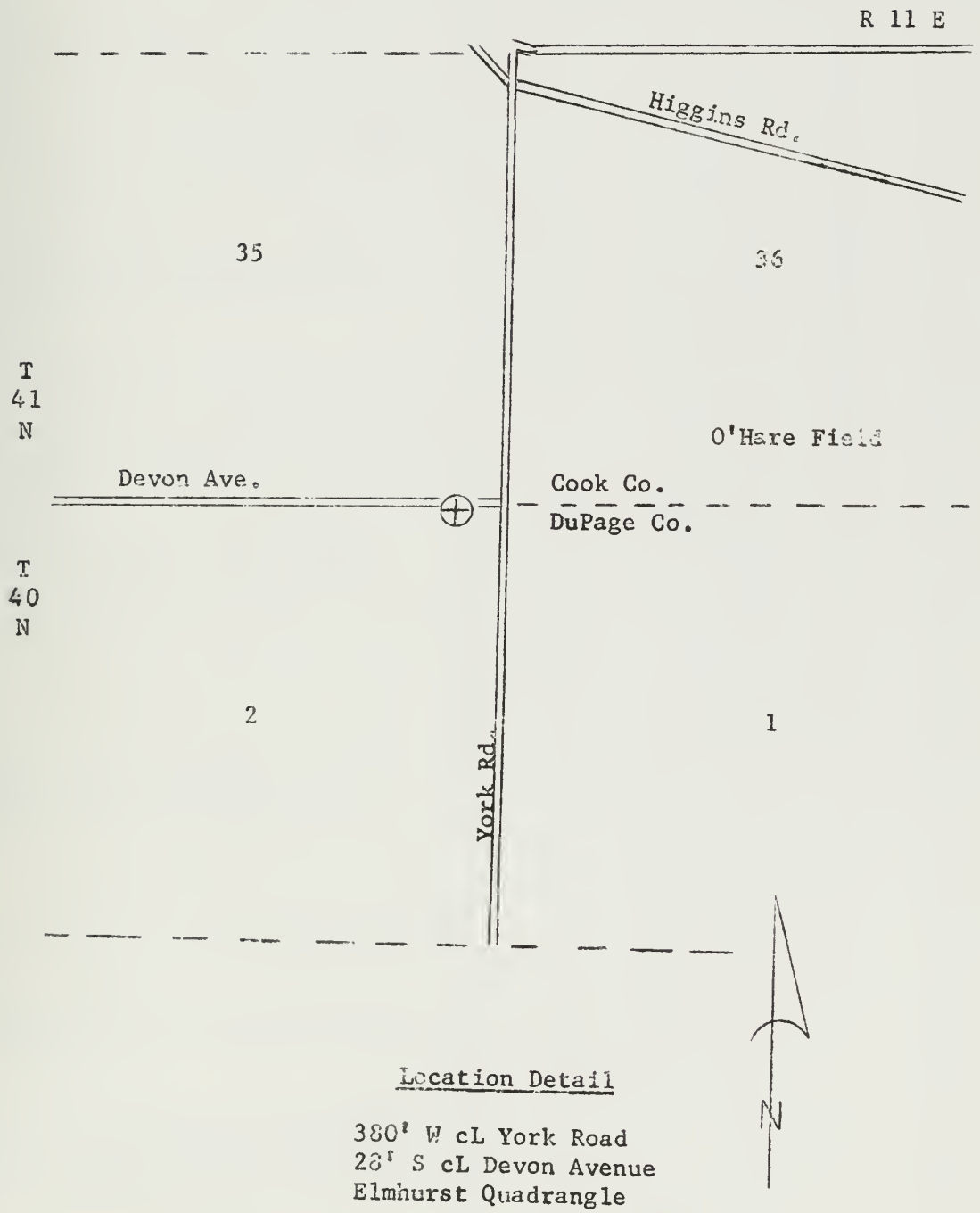


Fig. 8. - Location of boring DUP 40N11E-2.1h.

DRILLING RECORD FOR DUP 40N11E-2.1h

Surface elevation: 672.0 feet
Date started: 11-26-62
Date completed: 11-28-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
1.0	Topsoil, black							
	Clay, silty, brown mottled with gray, sandy; sand seams, pebbly	1	2S	2.0— 3.5	14	11	1.6	16.5
		2	2S	4.5— 6.0	18	16	4.8	12.4
9.0		3	2S	7.0— 8.5	18	24	5.2+	17.9
	Till — clay, silty, pebbly, gray-brown; grades to gray at 14.0'	4	2S	9.5—11.0	18	28	5.2+	11.5
		5	2S	12.0—13.5	18	17	3.4	18.9
16.5		6	2S	14.5—16.0	12	22	1.9	19.2
	Sand, fine to medium, brown, wet	7	2S	17.0—18.5	11	25		
21.5		8	2S	19.5—21.0	15	32		
	Till — clay, silty, brown	9	2S	22.0—23.5	12	13	1.9	18.5
27.5		10	2S	24.5—26.0	16	25	1.3	22.1
	Till — clay, silty, pebbly, gray; sand seams 32'-35'	11	2S	27.0—28.5	18	11	2.9	18.5
		12	2S	29.5—31.0	18	20	4.5	18.9
		13	2S	32.0—33.5	15	26	2.5	15.3
		14	2S	34.5—36.0	0	29	3.3	20.4
		15	2S	37.0—38.5	11	18		21.8
41.5		16	2S	39.5—41.0	10	16		
	Silt, sandy, gray; little clay, pebbles	17	2S	42.0—43.5	18	15		15.4
		18	2S	44.5—46.0	12	20		15.7
49.5		19	2S	47.0—48.5	15	23		16.2
52.0	Till — silt, clayey, gray; trace sand	20	2S	49.5—51.0	12	32		16.1
	Till — silt, clayey, gray; some sand	21	2S	52.0—53.5	9	17	3.5	11.6
		22	2S	54.5—56.0	12	21	5.0	22.3
59.5		23	2S	57.0—58.6	16	29	2.5	18.6

(Continued)

DRILLING RECORD FOR DUP 40N11E-2.1h - Continued

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Qu	MC
	Silt, clayey, gray-brown, with gray silt lenses	24	2S	59.5—61.0	18	33	7.9	19.5
64.0		25	2S	62.0—63.5	10	28	2.7	45.6
	Till — silt, clayey, gray; trace sand and gravel; grades to sandy silt at 82'	26	2S	64.5—66.0	18	29	9.3	11.9
		27	2S	67.0—68.5	18	67	2.9	11.9
		28	2S	69.5—71.0	0	85	9.7	10.8
		29	2S	72.0—73.5	7	139		12.1
		30	2S	74.5—75.3	10	150/10"	6.0	7.5
		31	SS	77.0—77.5	4	122/6"		
83.5		32	SS	79.5—80.0	5	130/6"		6.9
	Sand, fine, gray	33	SS	82.0—83.0	12	136		7.2
89.0		34	SS	84.5—86.0	10	73		
91.0	Till — silt, gray; trace fine sand	35	SS	87.0—88.5	0	96		
	Till — silt, clayey, gray; sandy pebbles	36	SS	89.5—91.0	8	120		11.6
		37	SS	92.0—93.5	17	99	7.0	9.8
		38	SS	94.5—96.0	10	50	2.5	9.5
101.0		39	SS	97.0—98.5	11	115	4.0	8.8
		40	SS	99.5—101.0	9	165		6.8

SIZE DISTRIBUTION DATA FOR DUP 40N11E-2.1h

Cohesive Materials

Sample	% >2.0 mm	% <2.0 mm	Size distribution of portion <2.0 mm: % >.062 mm	% >.004 mm	% <.004 mm
2A	5500	95.0	29	43	28
3B	1.0	99.0	30	46	24
4A	3.0	97.0	23	40	37
6	3.0	97.0	12	40	48
10A	3.0	97.0	18	41	41
11A	6.0	94.0	15	43	42
12A	5.0	95.0	15	43	42
16	4.0	96.0	10	46	44
18A	6.0	94.0	26	51	23
20A	0.0	100.0	2	68	30
22	1.0	99.0	6	32	62
23A	0.0	100.0	4	39	57
24A	0.0	100.0	2	47	51
25A	0.0	100.0	3	42	55
26B	3.0	97.0	3	46	51
30	9.0	91.0	29	49	22
32	14.0	86.0	30	52	18
34Bo	0.0	100.0	75	23	2
36	2.0	98.0	18	69	13
37A	13.0	87.0	30	47	23
40	18.0	82.0	34	45	21

Noncohesive Materials

Sample	Percentage retained on sieve: 4	9	16	24	32	42	60	80	115	170	Pan
7	0.8	1.6	0.5	0.2	0.4	3.7	53.3	28.0	4.2	1.4	5.9
8	0.7	1.1	0.8	0.3	0.5	3.4	52.0	33.0	4.7	1.1	3.3
34U	0.0	0.4	1.1	0.7	1.5	3.8	13.2	18.7	18.0	9.4	33.2

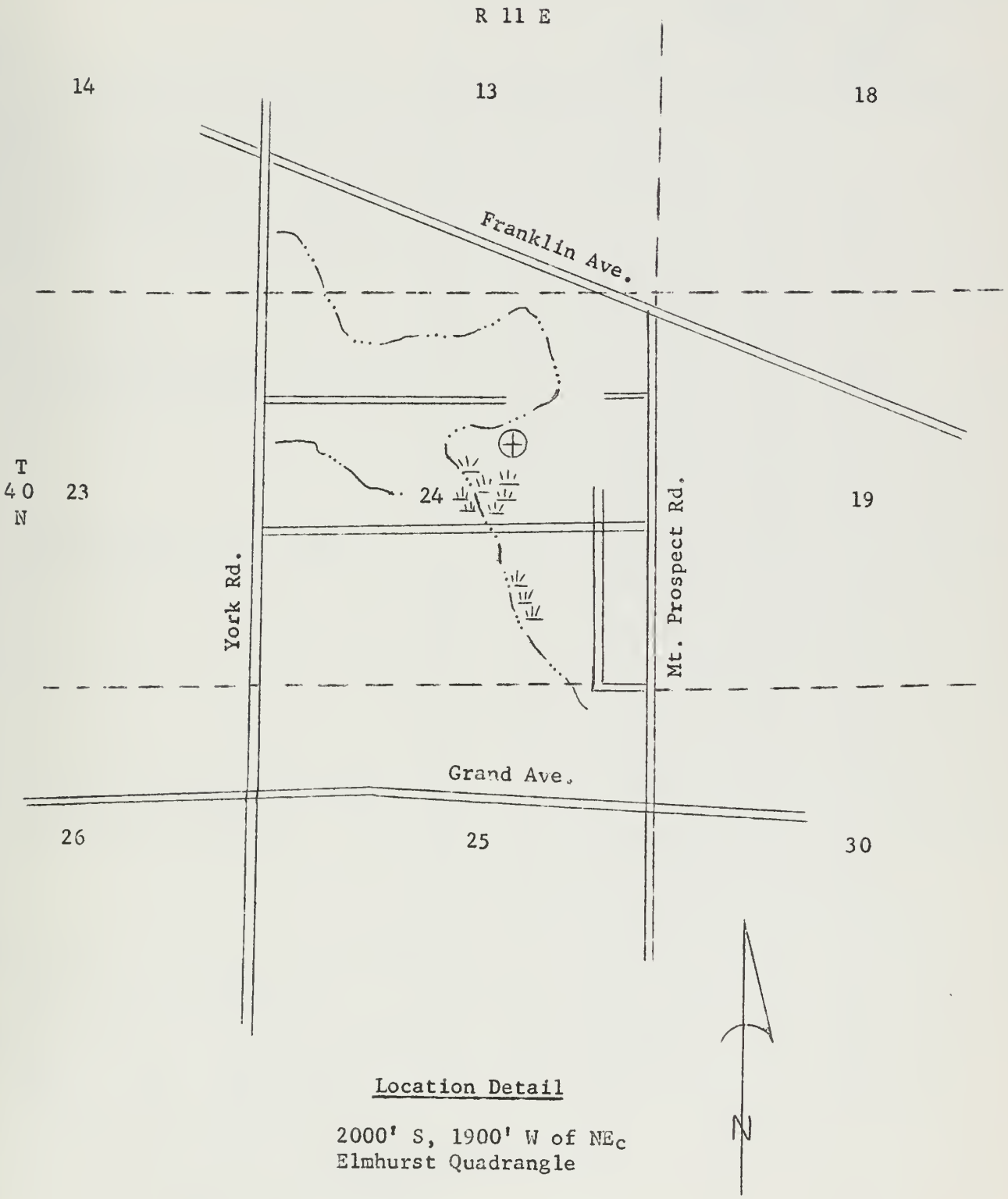


Fig. 9. - Location of boring DUP 40N11E-24.3e.

DRILLING RECORD FOR DUP 40N11E-24.3e

Surface elevation: 658.0 feet
Date started: 11-9-62
Date completed: 11-12-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
3.0	Topsoil, black, organic	1	2S	2.5— 4.0	4	7		18.4
4.5	*							
6.5	Sand, silty, gray; a few organic traces	2	2S	4.5— 6.0	8	3		5.7
7.5	Sand, clayey, gray, firm	3	2S	7.0— 8.5	12	29		9.8
10.0	**	4	2S	9.5—11.0	18	30		20.6
13.5	Silt, gray	5	2S	12.0—13.5	18	27		
16.5	Silt, clayey, gray; trace sand and gravel (till?)	6	2S	14.5—16.0	12	13		16.2
		7	2S	17.0—18.5	12	18	1.9	18.9
		8	2S	19.5—21.0	18	19	2.1	16.5
		9	2S	22.0—23.5	18	18	1.4	19.6
	Till — clay, silty, gray; trace shale sand	10	2S	24.5—26.0	12	18	2.5	19.2
		11	2S	27.0—28.5	18	23	3.6	15.0
30.0		12	2S	29.5—31.0	18	30	4.2	16.3
		13	2S	32.0—33.5	18	27	1.8	18.3
		14	2S	34.5—36.0	18	29	5.2	17.1
	Clay, silty, gray, hard, with layers of dark gray to black fine stratified sand	15	2S	37.0—38.5	18	53	4.5+	18.0
		16	2S	39.5—41.0		39		
44.0		17	2S	42.0—43.5	18	57	4.6	14.9
	Till — clay, silty, gray; trace sand and gravel	18	2S	44.5—46.0	18	52	5.2+	12.9
47.5		19	2S	47.0—48.5	18	141	4.5+	13.8
49.0	***							
51.5	Till — silt, clayey, gray, pebbly; very compact	20	2S	49.5—51.0	18	271	5.2+	

* Silt, clayey, gray and brown mottled; local wash
** Sand, fine, dark gray, dry; stratified
*** Till — silt, gray; trace fine sand

(Continued)

DRILLING RECORD FOR DUP 40N11E-24.3e - Continued

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
	Till — silt, clayey, gray; trace sand and gravel	21	2S	52.0—53.5	15	101	5.2+	
		22	2S	54.5—56.0	16	135	5.2+	9.1
		23	2S	57.0—58.5	18	106	5.2+	10.8
61.9		24	2S	59.5—61.0	18	68	5.2+	14.3
62.5	Bedrock — light gray limestone	25	2S	62.0—62.5	3	200		

SIZE DISTRIBUTION DATA FOR DUP 40N11E-24.3e

	Cohesive Materials				
			Size distribution of portion < 2.0 mm		
Sample	% > 2.0 mm	% < 2.0 mm	% > .062 mm	% > .004 mm	% < .004 mm
2	7.0	93.0	48	33	19
3	5.0	95.0	70	26	4
4	1.0	99.0	5	88	7
5A	0.0	100.0	16	74	10
5B	0.0	100.0	1	88	11
6A	8.0	92.0	43	44	13
6B	2.0	98.0	21	64	15
7	5.0	95.0	14	43	43
8	14.0	86.0	15	42	43
9	3.0	97.0	15	41	44
10	10.0	90.0	11	43	46
11	9.0	91.0	23	48	29
12	3.0	97.0	17	40	43
13	1.0	99.0	29	41	30
14A	2.0	98.0	58	30	12
14B	1.0	99.0	9	42	49
15	1.0	99.0	6	42	52
16	0.0	100.0	9	57	34
17	7.0	93.0	25	54	21
18	9.0	91.0	26	50	24
19	16.0	84.0	26	53	21
20	17.0	83.0	30	49	21
21	24.0	76.0	39	46	45
22	16.0	84.0	29	48	23
23	4.0	96.0	15	43	42
24	4.0	96.0	14	43	43

Location Detail

350' W cL Grace Road
18' N cL Fullerton Avenue
2250' E, 18' N of SW_c
Lombard Quadrangle

Fig. 10. - Location of boring DUP 40N11E-29.5a.

DRILLING RECORD FOR DUP 40N11E-29.5a

Surface elevation: 695.0 feet
Date started: 12-10-62

Hammer weight: 140 pounds
Hammer drop: 30 inches
Boring method: Hollow auger

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
1.5	Topsoil, black	1	2S	2.0— 3.5	12	32	9.7+	14.1
	Till — clay, silty, brown; trace sand, pebbly; grades to darker brown below 8'	2	2S	4.5— 6.0	14	28	4.7	18.5
		3	2S	7.0— 8.5	14	27	6.8	20.2
		4	2S	9.5—11.0	12	28	7.2	18.6
12.5		5	2S	12.0—13.5	18	44	6.6	18.4
	Till — clay, sandy, gray; gravelly seams; a few silt partings	6	2S	14.5—16.0	18	20	3.7	14.6
16.5		7	2S	17.0—18.5	10	43		
		8	2S	19.5—21.0	12	14		
		9	2S	22.0—23.5	12	40		
		10	2S	24.5—26.0	12	18		
		11	SS	29.5—31.0	12	18		
		12	SS	34.5—36.0	8	14		
		13	SS	39.5—41.0	10	15		
		14	SS	44.5—46.0	8	16		
	Sand, gravelly, dark gray; grades to fine to medium at 25' and fine at 35'	15	SS	49.5—51.0	10	28		
		16	SS	54.5—56.0	10	35		
		17	SS	59.5—61.0	10	44		
		18	SS	64.5—66.0	0	52		
		19	SS	69.5—71.0	8	65		
		20	SS	74.5—75.5	2	150/14"		
60.0								

(Sample 20 description continued on next page.)

DRILLING RECORD FOR DUP 40N11E-29.5a - Continued

Depth (ft)	Description of material	Samples						
		No.	Type	Depth (ft)	Recovery (in.)	Blows/ft drop hammer	Q_u	MC
	Gravel, sandy, fine to coarse, gray	20 (Continued)						
72.5								
	Gravel, coarse, gray; cobbles and boulders							
75.5								

SIZE DISTRIBUTION DATA FOR DUP 40N11E-29.5a

Cohesive Materials

Sample	% >2.0 mm	% < 2.0 mm	Size distribution of portion <2.0 mm		
			% >.062 mm	% >.004 mm	% <.004 mm
2	4.0	96.0	12	39	49
4	5.0	95.0	15	43	42
5A	7.0	93.0	17	46	37
6A	15.0	85.0	46	37	17
9B	15.0	85.0	55	32	13

Noncohesive Materials

Sample	Percentage retained on sieve										
	4	9	16	24	32	42	60	80	115	170	Pan
7	25.4	24.4	19.9	8.7	8.6	5.2	2.7	0.9	0.8	0.6	2.8
8	8.2	9.5	19.5	11.3	14.0	9.8	15.6	6.9	1.6	0.8	2.8
9A	9.8	10.1	21.3	13.9	17.5	11.6	7.2	2.2	1.3	0.9	4.2
11	0.2	1.0	6.7	9.3	25.4	28.0	13.8	3.8	2.6	1.5	1.7
13	0.0	0.1	0.1	0.3	6.4	22.1	36.6	15.9	8.0	3.2	7.3
15	22.1	7.4	7.6	8.0	23.3	17.0	6.4	2.0	1.4	0.8	4.0
17	6.9	14.5	14.7	7.2	9.8	13.7	15.7	5.3	2.8	1.7	7.7
19	40.5	12.0	14.1	5.8	6.4	4.3	3.5	2.0	1.8	1.5	8.1

ENVIRONMENTAL GEOLOGY NOTES SERIES

1. Controlled Drilling Program in Northeastern Illinois:
J. E. Hackett and G. M. Hughes. April 1965